

Introductions for Biological Control in Hawaii: 1975 & 1976

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The Entomology Branch of the Hawaii Department of Agriculture has maintained a beneficial organism introduction program for many years. This paper includes a list of insects introduced for biological control during 1975 and 1976, with notes on the status of some pests and their purposely introduced natural enemies.

WEED PEST CONTROL

***Ageratina riparia* (Regel) K. & R. (Hamakua pamakani)**

The stem galling tephritid, *Procecidochares alani* Steyskal, is now firmly established in all release areas on Hawaii and, in most cases, isolated establishments have coalesced to form contiguous infestations. The leaf defoliating pterophorid, *Oidaematophorus* sp., which was recovered for the first time in February 1975, has significantly increased its range of establishment on Hawaii. *P. alani* has adapted to the lower elevations up to 3,000' while *Oidaematophorus* sp. is confined primarily to the higher elevations from 2,000' to 4,000' with an overlapping of their activities at the 2,000' to 3,500' elevations.

Since its release in November 1975 in the Kona District, the leaf spotting fungus disease, *Cercospora* n. sp. has spread rapidly and caused heavy defoliation at the 3,000' to 5,000' elevation.

INSECT PEST CONTROL

***Aleurocanthus spiniferus* Quaintance (Orange spiny whitefly)**

The whitefly is reported to be one of the most destructive pests of citrus in Tropical Asia, however, it has not developed into a serious pest on Oahu, the only island in Hawaii where it is presently known to occur. Only scattered infestations were found during 1975 and 1976, mostly on roses. Studies have shown that *Prospaltella smithi* Silvestri, a parasite introduced from Japan in 1974, was the primary factor contributing to the low population and slow dispersal of *A. spiniferus* on Oahu. Three other aphelinids, previously not known to occur in Hawaii, were found parasitizing *A. spiniferus* during parasite evaluation studies. These were identified as *Encarsia variegata* Howard, and two other *Encarsia* spp. not yet placed to species. Two species of *Prospaltella* (*opulenta* Silvestri and *clypealis* Silvestri) were purposely introduced from Texas in December 1975, but they have not been recovered. A platygasterid, *Amitus hesperidum* Silvestri, introduced from Mexico in 1974 has also not been recovered.

***Erionota thrax* L. (Banana skipper)**

The heavy populations of this skipper, which occurred in commercial banana plantings in windward Oahu in 1974, subsided considerably by December 1975, and only trace to light infestations occurred on all infested islands throughout 1976. This population decline was attributed to the effectiveness of the egg parasite,

TABLE 1. *Introductions for Biological Control in Hawaii, 1975 and 1976*
(Unless otherwise indicated, all introductions by Entomology Branch, Hawaii Department of Agriculture)

Pest Needing Control	Organism Introduced	Source	Sender	No. Rel'd*	Date Rel'd	Release Point
<i>Achatina fulica</i> Bowdich (Giant African snail)	<i>Gonaxis kibweziensis</i> (Smith) (Pulmonata: Streptaxidae)	Palau, Caroline Islands	D. Otobed	403	11/76	Kauai localities
<i>Aleurocanthus spiniferus</i> Quaint. (Orange spiny whitefly)	<i>Prospaltella opulenta</i> Silvestri <i>Prospaltella clypealis</i> Silvestri (Hymenoptera: Aphelinidae)	USDA, Brownsville, Texas USDA, Brownsville, Texas	— —	70 70	12/75 12/75	Kapahulu, Oahu Kapahulu, Oahu
<i>Haemotobia irritans</i> (L.) (Horn fly)	<i>Onthophagus nigriventris</i> D'Orbigny <i>Onthophagus foliaceus</i> Lansberg (Coleoptera: Scarabaeidae) <i>Onitis alexis</i> Klug <i>Onitis vanderkelleni</i> Lansberg (Coleoptera: Scarabaeidae)	CSIRO, Caanberra, Australia Australia Australia Australia	D. Waterhouse D. Waterhouse D. Waterhouse D. Waterhouse	100 100 158 490	8/75 8/75 2/76 2/76	Kahua Ranch, Hawaii Kahua Ranch, Hawaii Parker Ranch, Hawaii Parker Ranch, Hawaii
<i>Keiferia lycopersicella</i> (Wals.) (Tomato pinworm)	<i>Apanteles dignus</i> Muesebeck (Hymenoptera: Braconidae) <i>Apanteles gelechiidivorus</i> (Marsh) (Hymenoptera: Braconidae)	Texas-Mexico University of California -Riverside	R. Burkhart E. Oatman	16 36	7/76 7/76	Kahaluu, Oahu Kahaluu, Oahu
<i>Liriomyza</i> spp. (Leafminers)	<i>Diglyphus isaea</i> (Walker) <i>Diglyphus intermedius</i> (Girault) (Hymenoptera: Eulophidae) <i>Sympiesis</i> n. sp. (Hymenoptera: Eulophidae) <i>Opius dimidiatus</i> (Ashmead) (Hymenoptera: Braconidae) <i>Chrysocharis parksi</i> Crawford (Hymenoptera: Eulophidae) <i>Diglyphus pulchripes</i> (Crawford) (Hymenoptera: Eulophidae)	USDA, Newark, Del. USDA, Newark, Del. USDA, Newark, Del. USDA, Newark, Del. USDA, Newark, Del. Indio, California USDA, Newark, Del.	— — — — — R. Burkhart —	200 25 420 200 225 70	8/75 9/75 5/76 5/76 12/76 11/76	Kapahulu, Oahu Ewa, Oahu Kihei, Maui Kaunakani, Kauai Pearl City, Oahu Kaunakani, Kauai

* Applies to initial release only.

	<i>Chrysocharis giraulti</i> Yoshimoto (Hymenoptera: Eulophidae)	USDA, Newark, Del.	400	11/76	Omaopio, Maui
<i>Liriomyza</i> spp. (Continued) (Leafminers)	<i>Diglyphus</i> n. sp. (Hymenoptera: Eulophidae)	Linares, Mexico	R. Burkhart	1,200	12/76 Waimanalo, Oahu
	<i>Cothonaspis</i> n. sp. (Hymenoptera: Cynipidae)	Texas	R. Burkhart	600	12/76 Pearl City, Oahu
	<i>Chrysocharis clarkae</i> Yoshimoto	USDA, Newark, Del.	—	250	6/76 Pearl City, Oahu
<i>Papilio xuthus</i> L. (Citrus Swallowtail)	<i>Pteromalus luzonensis</i> Gahan (Hymenoptera: Pteromalidae)	Agana, Guam	R. Muniappan	511	7/75 Kapahi, Kauai
<i>Pineus pini</i> Koch (Eurasian pine aphid)	<i>Leucopis obscura</i> Haliday (Diptera: Chamaemyiidae)	European Parasite Lab. USDA, France	—	878	5/76 Hawaii and Maui
	<i>Scymnus suturalis</i> Thunberg (Coleoptera: Coccinellidae)	USDA, France		80	5/76 Hawaii and Maui
<i>Semiothisa</i> prob. <i>santaremaria</i> (Walker) (Koa haole moth)	<i>Meteorus laphygmae</i> Viereck (Hymenoptera: Braconidae)	Bio Control of Insects Res. Lab., ARS, USDA, Columbia, Mo.	—	100	6/75 Kekaha, Kauai
<i>Tetranychus cinnabarinus</i> Boisd. (Carmine spider mite)	<i>Metaseiulus occidentalis</i> (Nesbitt) (Mesostigmata: Phytoseiidae)	+ Rincon-Vitova Co., California	E. J. Dietrick	10,640	3/75 Kahului, Maui
	<i>Phytoseiulus persimilis</i> A. & H. (Mesostigmata: Phytoseiidae)	+ University of California Riverside	J.A. McMurtry	14,250	5/75 Mass reared at U. H. and released on Kauai, Oahu, Maui and Hawaii
<i>Therioaphis maculata</i> (Buckton) (Spotted alfalfa aphid)	<i>Trioxys complanatus</i> Quilis (Hymenoptera: Braconidae)	University of California Berkeley	K. S. Hagan	112	11/75 Hickam AFB, Oahu

*Applies to initial release only.

+ Importation arranged by F. H. Haramoto, University of Hawaii.

Ooencyrtus erionotae Ferriere, and the larval parasite, *Apanteles erionotae* Wilkinson. Both parasites were mass reared and also liberated on Kauai, Maui, Hawaii and Molokai. *E. thrax* was discovered on Kauai and Maui in 1974 and on Hawaii and Molokai in 1975. Since *E. thrax* populations were at insignificant levels on all islands by December 1976, mass rearing of parasites was discontinued.

Liriomyza spp. (Leafminers)

Although several species of parasites are known to attack leafminers in Hawaii, these parasites are not exerting adequate control of the leafminers. Additional species of parasites have been introduced and released in many areas.

Since leafminers have a wide range of hosts, including weeds as well as crops, most of the parasite releases were made in localities where unsprayed weed hosts were abundant.

Melipotis indomita (Walker) (Monkeypod-kiawe caterpillar)

The periodic outbreaks of this noctuid diminished in severity during 1975 and by December 1976, *M. indomita* populations on Oahu, Hawaii, Kauai and Maui were low, compared to those prior to 1975. A tachinid, *Eucelatoria* sp., introduced from Mexico and released on Oahu in April 1974, was recovered initially in March 1975 and subsequent surveys and parasitization studies revealed that it was well established on Oahu. Releases of this parasite were made on Hawaii in June and August 1974, on Kauai between November 1974 and June 1975, and on Maui in June 1975. The effectiveness of the egg parasite, *Trichogramma* sp., in the field (nearly 100% in the insectary) has not been determined.

Papilio xuthus L. (Citrus swallowtail)

Populations were variable but generally light throughout 1975 and 1976. This citrus pest occurs on all islands. It has not posed a serious threat to the citrus growers on Hawaii. The prepupal parasite, *Pteromalus luzonenis* Gahan, introduced from Guam in 1975, was recovered on several occasions on Maui.

Therioaphis maculata (Buckton) (Spotted alfalfa aphid)

This alfalfa pest was discovered in a pitfall trap at Ewa, Oahu in March 1975 and subsequently on burr clover, *Medicago hispida*, black medic clover, *M. lupulina*, and alfalfa, *M. sativa* at Hickam Air Force Base, Ewa, and Wahiawa. This discovery led to the introduction of a braconid parasite, *Trioxya complanatus* Quilis, from the Division of Biological Control, University of California at Berkeley. *T. complanatus* was found established two months after its initial release in November 1975 and contributed in preventing heavy population of *T. maculata* on Oahu.

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